

ANTENNA SUBSYSTEM CALIBRATION APPARATUS AND METHODS  
IN SPATIAL-DIVISION MULTIPLE-ACCESS SYSTEMS

ABSTRACT

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A wireless local area network (WLAN) includes an access point (AP), which provides communications channels to a plurality of stations. The AP supports spatial-division, multiple-access (SDMA) and accordingly includes a plurality of antenna subsystems. In order to achieve zero-forcing downlink beamforming,  
10 internal calibration procedures are occasionally performed within the AP. An internal calibration procedure includes an antenna subsystem transmitting a calibration signal. Received signals are measured at other antenna subsystems, and from these measurements, the transmit and receive chain gains are calculated for each antenna subsystem. One or more of these gains are adjusted to satisfy a  
15 primary condition, which is that the ratio of the transmit chain gain and the receive chain gain for all of the antenna subsystems are approximately equal (i.e., all of these ratios are equal to a calibration constant).

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